

CLAIMS

1) Device for varying the compression ratio of an internal combustion engine having at least one cylinder (10) with a combustion chamber (20), moving parts comprising a piston (14) translationally movable under the action of a connecting rod (16) that is connected by a shaft (24) to said piston and connected to a crankpin (34) of a crankshaft (36), said piston effecting travel between a top dead center and a bottom dead center leaving a dead volume (40, 118) at the top dead center of said piston, the device having a rotary pull type eccentric (42) for varying the compression ratio and means (34; 78a, 78b) for controlling the movement of the eccentric, characterized in that the control means include a hydraulic cylinder (76) comprising a slide (54) placed in a recess (56) formed in a support (58) and delimiting two fluid chambers (75a, 75b) in communication with at least one closed circuit (77; 78a, 78b).

2) Device for varying the compression ratio according to Claim 1, characterized in that the fluid chambers (75a, 75b) are in communication with each other via at least one closed circuit (77; 78a, 78b).

3) Device for varying the compression ratio according to least one of Claims 1 or 2, characterized in that the closed circuit includes at least one valve means (82a, 82b; 126) for controlling the flowrate of fluid from one chamber to the other.

4) Device for varying the compression ratio according to Claim 3, characterized in that the valve means is an at least two-way valve (82a, 82b).

5) Device for varying the compression ratio according to Claim 3, characterized in that the valve means is a piezoelectric device (126).

6) Device for varying the compression ratio according to Claim 5, characterized in that the piezoelectric device includes a needle valve (128) and a piezoelectric actuator (130).

7) Device for varying the compression ratio according to Claim 5 or 6, characterized in that the piezoelectric device is controlled by cooperation of contacts (132) and electrical segments (134).

8) Device for varying the compression ratio according to Claim 3 characterized in that the circuit includes at least one metering device (92a, 92b) located downstream of the valve means.

9) Device for varying the compression ratio according to Claim 8, characterized in that the metering device includes a piston-cylinder assembly (94a; 96a) with a calibrating spring (102a).

10) Device for varying the compression ratio according to Claim 1, characterized in that the elements of the closed circuit are at least partly accommodated in hydraulic cylinder (76).

11) Device for varying the compression ratio according to one of the foregoing claims, characterized in that the varying device includes means (136) for pinpointing the position of the eccentric (42).

12) Device for varying the compression ratio according to Claim 11, characterized in that the pinpointing means comprise a signal transmitter-receiver assembly (136).

13) Device for varying the compression ratio according to Claim 12, characterized in that the eccentric (42) includes the transmitter (140, 148) and in that the receiver (142) is accommodated in a fixed part (138) of the engine.

14) Device for varying the compression ratio according to one of the foregoing claims, characterized in that the eccentric includes means for shape cooperation (48, 52) with the slide.

15) Device for varying the compression ratio according to Claim 14, characterized in that the cooperation means include a toothed sector (48) mounted on the eccentric (42) and a toothed rack (52) mounted on the slide (54).

16) Method for varying the compression ratio of an internal combustion engine, said engine including at least one cylinder (10) with a combustion chamber (20), moving parts comprising a piston (14) translationally movable under the action of a connecting rod (16) that is connected by a shaft (24) to said piston and connected to a crankpin (34) of a crankshaft (36), said piston effecting travel between a top dead center and a bottom dead center leaving a dead volume (40, 118) at the top dead center of said piston, characterized by the method consisting of:

- determining the desired compression ratio of the engine,
- determining the extent of displacement of a rotary pull type eccentric (42) to obtain the desired compression ratio,
- controlling the rotation of the eccentric (42) to obtain the displacement determined by controlling a hydraulic cylinder (76) to command the displacement of the eccentric (42).